CLAIMS

1.   A sheet identifying device comprising:

a transmission optical sensor which emits transmission light to a sheet to obtain an image of the sheet based on the transmission light;

watermark area extracting means for extracting an image of a watermark area where a watermark pattern is present, from the image obtained by the transmission optical sensor;

identification object image data extracting means for extracting identification object image data that is used as an object of identification in identifying the sheet, from the watermark area extracted by the watermark area extracting means;

unnecessary image detecting means for detecting an unnecessary image in the identification object image data extracted by the identification object image data extracting means; and

sheet identifying means for identifying the sheet based on the identification object image data and the unnecessary image detected by the unnecessary image detecting means.

2.   The sheet identifying device according to Claim 1, wherein the identification object image data extracting means comprises watermark pattern displacement calculating means for calculating a displacement of the watermark pattern relative to the watermark area extracted by the watermark area extracting means,

whereby the identification object image data is extracted from the watermark area based on the displacement calculated by the watermark pattern displacement calculating means.

3.   The sheet identifying device according to Claim 2, wherein the watermark pattern displacement calculating means comprises:

watermark area information calculating means for calculating watermark area information of the watermark area extracted by the watermark area extracting means; and

watermark area gravity center calculating means for calculating center of gravity

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of the watermark area based on the watermark area information calculated by the watermark area information calculating means,

whereby the displacement of the watermark pattern is calculated based on the center of gravity of the watermark area calculated by the watermark area gravity center calculating means.

4. The sheet identifying device according to Claim 3, wherein the sheet identifying means identifies the sheet based on the watermark area information calculated by the watermark area information calculating means.

5. The sheet identifying device according to Claim 3, wherein the watermark area information comprises area, degree of circularity, and length of circumference of the watermark area.

6. The sheet identifying device according to Claim 1, wherein the unnecessary image detecting means comprises difference calculating means for calculating a difference between the identification object image data extracted by the identification object image data extracting means and a template that has previously been obtained from an authentic sheet,

whereby an unnecessary image in the identification object image data is detected based on the difference calculated by the difference calculating means.

7. The sheet identifying device according to Claim 6, wherein the sheet identifying means identifies the sheet based on the difference calculated by the unnecessary image detecting means.

8. The sheet identifying device according to Claim 1, wherein the sheet identifying means identifies the sheet by comparing the identification object image data corrected for the unnecessary image detected by the unnecessary image detecting means with the template.

9. A sheet identifying method comprising:
irradiating transmission light to a sheet;

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obtaining an image of the sheet based on the transmission light;

extracting an image of a watermark area where a watermark pattern is present, from the obtained image;

extracting identification object image data that is used as an identification object in identifying the sheet, from the extracted watermark area;

detecting an unnecessary image in the extracted identification object image data; and

identifying the sheet based on the detected unnecessary image and the identification object image data.

10.   The sheet identifying method according to Claim 9, further comprising:

calculating a displacement of the watermark pattern relative to the watermark area; and

extracting the identification object image data from the watermark area based on the displacement thus calculated.

11.   The sheet identifying method according to Claim 10, further comprising:

calculating watermark area information of the watermark area;

calculating center of gravity of the watermark area based on the watermark area information thus calculated; and

calculating the displacement of the watermark pattern based on the center of gravity of the watermark area thus calculated.

12.   The sheet identifying method according to Claim 11, wherein the sheet is identified based on the watermark area information.

13.   The sheet identifying method according to Claim 11, wherein the watermark area information comprises area, degree of circularity, and length of circumference of the watermark area.

14.   The sheet identifying method according to Claim 9, further comprising:

calculating difference between the identification object image data and a template that is previously obtained from an authentic sheet; and

detecting an unnecessary image in the identification object image data based on the difference thus calculated.

15.   The sheet identifying method according to Claim 14, wherein the sheet is identified based on the difference.

16.   The sheet identifying method according to Claim 9, wherein the sheet is identified by comparing the identification object image data corrected for the unnecessary image with the template.